

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

Claim 1-29. (Canceled)

30. (Currently Amended) A polymer scaffold microfabricated by a method comprising:

generating an elastomer mold;
directing a polymer into the mold;
curing the polymer in the mold to form a polymer scaffold; and
removing the cured polymer scaffold from the mold; and
assembling two or more cured polymer scaffolds to provide a layered polymer scaffold.

31. (Previously Presented) A microfabricated polymer scaffold comprising a membrane comprised of a surface with varying topology.

Claims 32-33. (Canceled)

34. (Previously Presented) The polymer scaffold of claim 30, wherein the elastomer is selected from the group consisting of a silicone polymer, a poly(dimethylsiloxane) (PDMS) and an epoxy polymer.

35. (Previously Presented) The polymer scaffold of claim 30, wherein the polymer is a biopolymer.

36. (Previously Presented) The polymer scaffold of claim 30, wherein the polymer is selected from the group consisting of poly(DL-lactic acid) (PLA), poly(DL-lactic-co-glycolic acid) (PLGA) and poly(L-lactic acid) (PLLA).

37. (Previously Presented) The polymer scaffold of claim 30, wherein the polymer is a hydrogel.

38. (Previously Presented) The polymer scaffold of claim 37, wherein the hydrogel comprises polyethylene glycol, polyethylene oxide, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylates, poly (ethylene terephthalate), poly(vinyl acetate), and copolymers and blends thereof.

39. (Withdrawn) The polymer scaffold of claim 30, further comprising coating the cured polymer scaffold with a substance selected from the group consisting of biomolecules, peptides and proteins that modulate cell adhesion.

40. (Withdrawn) The polymer scaffold of claim 39, wherein the substances promote cell adhesion.

41. (Withdrawn) The polymer scaffold of claim 40, wherein the substance is selected from the group consisting of collagen, fibronectin, vitronectin, Arg-Gly-Asp (RGD) and Tyr-Ile-Gly-Ser-Arg (YIGSR) peptides, glycosaminoglycans (GAGs), hyaluronic acid (HA), integrins, selectins and cadherins.

42. (Withdrawn) The polymer scaffold of claim 39, wherein the substances inhibit cell adhesion.

43. (Withdrawn) The polymer scaffold of claim 42, wherein the substances comprise triblock polymers.

44. (Withdrawn) The polymer scaffold of claim 39, wherein the substances are selected from a list consisting of pluronic, surfactants, bovine serum albumin, poly hydroxyethylmethacrylate, polyacrylamide, and polymethymethacrylate.

45. (Previously Presented) The polymer scaffold of claim 30, further comprising inducing porosity by contacting the polymer with a particulate leaching agent.

46. (Previously Presented) The polymer scaffold of claim 45, wherein the particular leaching agent is selected from the group consisting of sugar, salt and protein.
47. (Canceled)
48. (Previously Presented) The method of claim 23, further comprising the attachment of the two dimensional structures to each other by applying mechanical pressure and heating.
49. (Previously Presented) The polymer scaffold of claim 30, further comprising contacting the polymer scaffold with cells.
50. (Previously Presented) The microfabricated polymer scaffold of claim 31, wherein the membrane comprises a biopolymer.
51. (Previously Presented) The microfabricated polymer scaffold of claim 50, wherein the biopolymer is selected from the group consisting of poly(DL-lactic acid) (PLA), poly(DL-lactic-co-glycolic acid) (PLGA) and poly(L-lactic acid) (PLLA).
52. (Previously Presented) The microfabricated polymer scaffold of claim 50, wherein the biopolymer is a hydrogel.
53. (Previously Presented) The microfabricated polymer scaffold of claim 52, wherein the hydrogel comprises polyethylene glycol, polyethylene oxide, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylates, poly (ethylene terephthalate), poly(vinyl acetate), and copolymers and blends thereof.
54. (Withdrawn) The microfabricated polymer scaffold of claim 31, further comprising coating the membrane with a substance selected from the group consisting of biomolecules, peptides and proteins that modulate cell adhesion.
55. (Withdrawn) The microfabricated polymer scaffold of claim 54, wherein the substances promote cell adhesion.

56. (Withdrawn) The microfabricated polymer scaffold of claim 55, wherein the substance is selected from the group consisting of collagen, fibronectin, vitronectin, Arg-Gly-Asp (RGD) and Tyr-Ile-Gly-Ser-Arg (YIGSR) peptides, glycosaminoglycans (GAGs), hyaluronic acid (HA), integrins, selectins and cadherins.
57. (Withdrawn) The microfabricated polymer scaffold of claim 54, wherein the substances inhibit cell adhesion.
58. (Withdrawn) The microfabricated polymer scaffold of claim 57, wherein the substances comprise triblock polymers.
59. (Withdrawn) The microfabricated polymer scaffold of claim 54, wherein the substances are selected from a list consisting of pluronics, surfactants, bovine serum albumin, poly hydroxyethylmethacrylate, polyacrylamide, and polymethymethacrylate.
60. (Previously Presented) The microfabricated polymer scaffold of claim 31, wherein the membrane is porous.
61. (Previously Presented) The microfabricated polymer scaffold of claim 31, wherein the membrane is a mesh.
62. (Previously Presented) The microfabricated polymer scaffold of claim 31, wherein the membrane comprises a plurality of membranes.
63. (Previously Presented) The microfabricated polymer scaffold of claim 31, further comprising cells attached to the membrane.
64. (Previously Presented) The polymer scaffold of claim 37, wherein the hydrogel comprises cells.